

MTT-S Technical Committee Chairmen

Coordinating Chairman: K. AGARWAL

Computer-Aided Design

B. S. PERLMAN
S. L. MARCH

Submillimeter-Wave Techniques

K. J. BUTTON
M. AFSAR

Microwave and Millimeter-Wave Solid-State Devices

H. J. KUNO

Microwave Ferrites

J. M. OWENS
W. E. HORD

Manufacturing Technology

S. J. TEMPLE

Microwave Systems

G. L. HEITER
J. B. HORTON

Microwave Superconductor Applications

E. BELOHOUBEK

Microwave Network Theory

A. E. WILLIAMS
P. LA TOURETTE

Microwave Acoustics

T. J. LUKASZEK

Microwave High-Power Techniques

J. GOEL
N. WILSON

Biological Effects and Medical Applications

A. ROSEN

Microwave Low Noise Techniques

J. J. WHELEHAN, JR.

Digital Signal Processing

I. A. MACK

Lightwave Technology

C. H. LEE

Microwave and Millimeter-Wave Integrated Circuits

J. C. WILTSE

Microwave Measurements

S. F. ADAM

Microwave Field Theory

J. MINK

Microwave and Millimeter Wave Packaging

B. BERSON
F. ROSENBAUM
D. MAKI

EDITORIAL BOARD

Editor

R. S. TUCKER

M. Abouzahra
E. R. Adair
J. D. Adam
S. F. Adam
A. T. Adams
W. R. Adey
M. G. Adlerstein
K. K. Agarwal
S. Ahn
M. Aikawa
M. Akaike
N. G. Alexopoulos
T. R. Apel
K. Araki
M. J. Archer
F. Arndt
H. Ashoka
A. E. Atia
H. A. Atwater
H. A. Auda
N. F. Audeh
B. A. Auld
I. Awai
Y. Ayasli
E. Bahar
I. J. Bahl
A. J. Bahr
S. N. Bajpai
C. A. Balanis
F. S. Barnes
P. P. Barsony
H. I. Bassen
T. E. Batchman
B. D. Bates
R. H. T. Bates
H. C. Bell
E. Belohoubek
P. Bernardi
F. Bernues
H. L. Bertoni
A. Beyer
J. B. Beyer
P. Bhartia
M. E. Bialkowski
T. A. Bickart
D. M. Bolle
J. Bornemann
J. A. Bradshaw
W. B. Bridges
M. E. Brodwin
D. M. Brookbanks
R. E. Brown
D. C. Buck
C. Buntschuh
J. Butler
C. A. Cain
J. A. Calviello
R. L. Camisa
A. G. Cardiasmenos
H. J. Carlin
J. W. Carlin
E. R. Carlson
P. H. Carr
J. E. Carroll
D. Ch'en
K. S. Champlin
C. S. Chang
C. T. M. Chang
D. C. Chang
K. Chang

S. K. Chang
W. S. C. Chang
C. Chao
K. M. Chen
M. H. Chen
W. C. Chew
J. Y. Choe
C.-K. Chou
Y. L. Chow
K. R. Cioffi
J. Citerne
B. J. Clifton
E. D. Cohen
L. A. Cohen
M. Cohn
S. B. Cohn
P. D. Coleman
R. E. Collin
G. I. Costache
M. L. Crawford
E. G. Cristal
H. M. Cronson
T. W. Crowe
A. L. Cullen
W. R. Curtice
W. E. Dahlke
H. deGruyl
J. V. DiLorenzo
S. Dixon
A. R. Djordjevic
C. Dragone
C. H. Durney
M. Dydyk
R. Eisenhart
M. El-Sherbiny
A. F. Emery
R. Engelman
G. F. Engen
W. J. English
G. W. Ewell
M. Faber
N. H. Farhat
H. R. Fetterman
S. J. Fiedziuszko
R. E. Fisher
V. A. Flyagin
K. R. Foster
E. Freibergs
H. Fukui
K. Fukui
Y. Fukuoka
G. J. Gabriel
R. J. Gagne
Z. Galani
H. Gamo
O. P. Gandhi
Y. Garault
F. E. Gardiol
R. V. Garver
L. E. Gatterer
V. G. Gelnovatch
W. J. Getsinger
R. Gilmore

J. Goel
P. F. Goldsmith
A. Gopinath
R. Gogal
V. L. Granatstein
J. Granlund
A. I. Grayzel
D. R. Green
P. Greiling
E. J. Griffin
V. Grigoriant
Q. Gu
P. Guillon
T. C. Guo
W. W. Guo
K. C. Gupta
M. S. Gupta
R. J. Gutmann
A. W. Guy
W. K. Gwarek
U. H. Gysel
G. I. Haddad
M. J. Hagmann
B. R. Hallford
M. A. K. Hamid
R. C. Hansen
E. H. Hara
P. Daly
R. F. Harrington
W. Harth
H. L. Hartnagel
H. Hasegawa
M. Hashimoto
G. L. Heiter
J. Helszajn
P. R. Herczfeld
S. J. Hewitt
A. R. Higashisaka
M. E. Hines
K. Hirai
W. J. R. Hoefer
C. A. Hoer
R. K. Hoffmann
D. C. Hogg
C. H. Holmes
L. H. Holway
K. Hongo
W. E. Hord
D. Hornbuckle
J. B. Horton
M. C. Horton
K. Hotate
H. Howe
H. P. Hsu
C. P. Hu
C. C. Huang
S. A. Ikuno
W. J. Ince
M. F. Iskander
T. Itoh
F. Ivanek
D. Jablonski
R. W. Jackson
R. H. Jansen
A. Jelenski
G. Jerinic
R. Jesch
W. T. Joines
A. K. Jordan
H. R. Jory
J. S. Joshi

R. Kagiwada
D. Kajfez
M. Kanda
G. Kantor
A. Karp
R. Kaul
S. Kawakami
D. B. Keck
P. Kennis
A. R. Kerr
O. B. Kesler
P. J. Khan
B. Kim
R. J. King
M. Kisliuk
D. P. Klemer
M. Kobayashi
Y. Kobayashi
T. Koike
E. L. Kollberg
J. Komiak
J. A. Kong
Y. Konishi
A. Konrad
N. S. Kopeika
M. Koshiba
H. G. Kosmahl
M. K. Krage
K. E. Kreischer
J. G. Kretzschmar
C. M. Krowne
B. B. Ktaroglu
W. Ku
E. F. Kuester
H. J. Kuno
R. Kuvas
P. M. La Tourrette
P. Lacy
P. E. Lagasse
J. Lampen
L. E. Larsen
P. A. A. Laura
R. A. Lawton
C. H. Lee
C. S. Lee
K. J. Lee
Y. Levitan
R. Levy
T. Li
J. C. Lin
I. V. Lindell
J. T. Loane
D. F. Love
N. Luhman
T. Lukaszek
S. A. Maas
R. H. MacPhie
M. Makimoto
M. Malkomes
S. L. March
D. Marcuse
M. E. Marhic
D. Masse
R. Mattauch
G. L. Matthaie
M. A. Maury, Jr.
P. Mayes
S. R. Mazumder
A. H. McCurdy

N. A. McDonald
P. R. McIsaac
M. W. Medley
K. K. Mei
P. J. Meier
H. Meinel
W. Menzel
K. A. Michalski
T. A. Midford
R. Minasian
J. Mink
M. Miyagi
T. Miyoshi
S. Mizushima
D. Rytting
C. R. Moore
R. A. Moore
F. R. Morganthaler
K. Morishita
N. Morita
D. Y. Mouh
Y. Naito
N. Nakajima
D. P. Neikirk
W. T. Nisbet
J. Nishizawa
J. D. Nordgard
G. Novick
D. P. Nyquist
K. Ogusu
F. Okada
H. Okamoto
Y. Okamura
H. C. Okean
T. Okoshi
S. Okwit
W. W. Oldfield
A. A. Oliner
H. G. Oltman
A. S. Omar
K. Osafune
J. M. Osephchuk
T. Y. Otsoshi
J. M. Owens
R. W. Paglione
S. F. Paik
D. Parker
C. Pask
D. Pavlidis
J. A. Pearce
J. Perini
B. S. Perlman
S. M. Perlow
D. F. Peterson
G. E. Peterson
R. M. Phillips
W. F. Pickard
J. Pierro
A. Pinchuk
R. D. Pollard
M. Pospieszalski
D. M. Pozar
P. Pramanick
R. Pregla
A. C. Priou
R. A. Pucel
J. L. Putz
J. P. Quine
J.-P. Ramey
J. Raue
C. Rauscher

M. E. Read
C.-L. Ren
J. D. Rhodes
A. N. Riddle
E. Rivier
V. Rizzoli
D. A. Rogers
U. L. Rohde
A. Rosen
F. J. Rosenbaum
H. E. Rowe
T. E. Rozzi
C. T. Rucker
D. Rutledge
D. Rytting
P. K. Saha
J. N. Sahalos
A. A. M. Saleh
A. J. Sangster
E. W. Sard
T. K. Sarkar
R. Sato
R. H. Saul
G. Saulich
J. O. Scanlan
D. H. Schaubert
J. M. Schellenberg
W. O. Schlosser
L. P. Schmidt
M. V. Schneider
H. E. Schrank
K. F. Schunemann
F. Sechi
S. R. Seshadri
J. C. Sethares
A. K. Sharma
H. Shibata
H. Shigesawa
Y. C. Shih
T. Shiozawa
K. Shirahata
T. Shshido
P. H. Siegel
P. Silvester
G. Smith
A. W. Snyder
R. V. Snyder
H. Sobol
P. I. Somlo
R. Sorrentino
R. A. Sparks
B. E. Spielman
P. Staecker
R. B. Stanciliff
W. H. Steier
K. D. Stephan
R. A. Stern
H. E. Stenehelfer
J. W. Strohbehn
S. S. Stuchly
C. C. Su
L. Susman
S. E. Sussman-Fort
W. Tabbara
A. Taflow
C. T. Tai
Y. Tajima
Y. Takayama
S. H. Talisa
J. Taub

R. Terakado
G. Thoren
J. C. Tippet
C. Toker
J. C. Toler
K. Tomiyasu
P. P. Toulhos
R. Trambarulo
O. J. Tretiak
R. J. Trew
T. N. Trick
T. Trinh
V. K. Tripathi
W. C. Tsai
G. N. Tsandoulas
H. Q. Tserng
C. Tsironis
M. Tsutsumi
A. Uhlir
B. Ulriksson
L. C. Upadhyayula
P. L. E. Uslenghi
N. K. Uzunoglu
R. Vahdieck
P. M. van den Berg
A. van der Ziel
R. L. Van Tuyt
A. Vander Vorst
J. Vorhaus
W. A. G. Voss
D. F. Wait
J. R. Wait
R. A. Waldron
J. Walsh
L. Wandinger
J. Watson
J. Webb
S. Weinreb
J. A. Weiss
S. H. Wemple
C. P. Wen
R. J. Wenzel
J. J. Whelehan
J. F. White
A. E. Williams
A. G. Williamson
P. F. Wilson
D. R. Wilton
J. C. Wiltse
W. Wissemann
M. T. Wlodarczyk
I. Wolff
Y.-S. Wu
S. Yamamoto
H. Yamasaki
E. Yamashita
K. Yashiro
K. Yasumoto
K. S. Yee
C. W. H. Yeh
H. C. Yen
G. L. Yip
T. Yoneyama
N. Yoshida
T. Yukawa
K. A. Zaki

INFORMATION FOR AUTHORS

IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES is published monthly. Manuscripts should be prepared especially for publication in this TRANSACTIONS and submitted to the Editor, Dr. Rodney Tucker, AT&T Bell Laboratories, Box 400, Holmdel, NJ 07733. The manuscripts must be typed double-spaced on 22 × 28 cm (8½ × 11 in) sheets or A4 sheets. All pages should be numbered. References and figure captions should start on separate sheets and should also be double spaced. Four copies of both the manuscript and accompanying illustrations should be submitted. Illustrations should be prepared with sufficiently large lettering and line widths to be legible when reduced in size to a single column width in the TRANSACTIONS. Note that this reduction may be as large as 4:1. Unnecessary detail and grids should be avoided and care should be taken to ensure that all graphs have clear scales and labels on the axes. In general, plots taken directly from laboratory instruments are not acceptable. Original illustrations should not be submitted initially, but will be called for if the paper is accepted for publication. An author whose manuscript is accepted as a PAPER (but not as a SHORT PAPER) is also requested to submit a short biography and a clear, glossy portrait photograph upon acceptance.

Each manuscript must include an abstract of not more than 200 words and the complete address of the corresponding author. The Editor reserves the right to return without a review manuscripts exceeding approximately 20 double-spaced typewritten pages plus 20 figures. SHORT PAPERS are limited to three pages of the TRANSACTIONS, and should describe new results or modifications and extensions to work already published in the literature. For guidance, one TRANSACTIONS page is equivalent to four doubly-spaced typewritten pages or to four figures. LETTERS are generally limited to comments and replies to material previously published in this TRANSACTIONS, suggestions for new work, errata, and other exceptionally short articles. "Information for IEEE authors" is available upon request from the IEEE Publications Department, 345 East 47th Street, New York, NY 10017.

Copyright

It is the policy of the IEEE to own the copyright to the technical contributions it publishes on behalf of the interest of the IEEE, its authors, and their employers, and to facilitate the appropriate reuse of this material by others. To comply with the U.S. Copyright Law, authors are required to sign an IEEE Copyright Form before publication. This form, a copy of which appears in each January issue of this TRANSACTIONS, returns to authors and their employers full rights to reuse their material for their own purposes. Authors must submit a signed copy of this form with their manuscripts.

Clearance of Manuscripts

The IEEE must of necessity assume that materials presented at its meetings or submitted to its publications are properly available for general dissemination to the audiences these activities are organized to serve. It is the responsibility of the author, not the IEEE, to determine whether disclosure of their material requires the prior consent of other parties, and if so, to obtain it.

Page Charges

Papers will be reviewed for their technical merit, and decisions to publish will be made independently of an author's ability or willingness to pay page charges. *Voluntary page charges* of \$110 per printed page will be requested for papers of five pages or less. *Overlength page charges* of \$200 per page are mandatory for each page in excess of five printed pages. If the author's supporting organization agrees to honor the total page charge, which includes the voluntary charges on the first five pages plus the mandatory charges for the excess pages, then the author will receive 100 free reprints of the paper. If the supporting organization will honor only the mandatory portion of the page charges, then no free reprints will be sent. Also, the MTT-S Administrative Committee has established a quota for the number of pages printed in each issue of this TRANSACTIONS whose costs are not defrayed by payment of page charges. Overlength papers not covered by the overlength page charges may be delayed until space in an issue is available. The Editor can waive the quota requirement for exceptional papers or because of other extenuating circumstances. Authors of overlength papers not covered by overlength page charges will be given the opportunity to reduce the length of the paper to meet the five-page length limit.